

National 5

Homework RE1

1. (a) A straight line passes through the points 1,4 and 4,13 . Find the gradient of the line.
(b) A straight line passes through the points 0,6 and 3,0 . Find the gradient of the line.

2. Draw accurate graphs of the following straight lines.

(a) $y = 2x + 3$

(b) $y = 3x - 1$

(c) $y = -2$

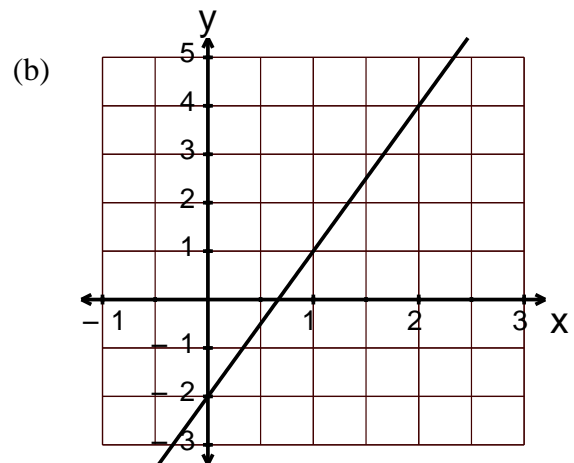
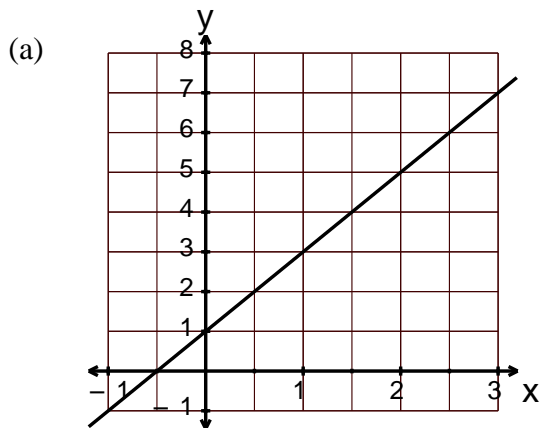
3. Write down the gradient and the y-intercept of each of the following straight lines.

(a) $y = 5x + 3$

(b) $y = -2x + 1$

(c) $y = \frac{1}{2}x - 4$

4. Find the equation of each of these straight lines.



5. Factorise

(a) $x^2 - 2x - 15$

(b) $10x - 2x^2$

(c) $3x^2 - 4x + 1$

6. Expand and simplify

(a) $3a + 2b \quad a - 3b$

(b) $x - 1 \quad x^2 - 2x - 2$

(c) $x - 3^2 - x - 1^2$

7. Evaluate, without a calculator,

(a) 2^6

(b) 3^{-2}

(c) $25^{\frac{1}{2}}$

8. Simplify

(a) $a^4 \times a^7$

(b) $a^5 \div a^{-3}$

(c) $\frac{a^3 \times a^2}{a^{-1}}$

(d) a^3^4

(e) \sqrt{x}^4

(f) a^{-3}^2

9. The following number patterns can be used to sum consecutive square numbers:

$$1^2 + 2^2 = \frac{2 \times 3 \times 5}{6}; \quad 1^2 + 2^2 + 3^2 = \frac{3 \times 4 \times 7}{6}; \quad 1^2 + 2^2 + 3^2 + 4^2 = \frac{4 \times 5 \times 9}{6}.$$

- (a) Express $1^2 + 2^2 + 3^2 + 4^2 + \dots + 10^2$ in the same way.
(b) Express $1^2 + 2^2 + 3^2 + 4^2 + \dots + n^2$ in the same way.

10. Brackets can be multiplied out in the following way:

$$\begin{aligned}(y+1)(y+2)(y+3) &= y^3 + (1+2+3)y^2 + (1 \times 2 + 1 \times 3 + 2 \times 3)y + 1 \times 2 \times 3 \\(y+2)(y+3)(y+4) &= y^3 + (2+3+4)y^2 + (2 \times 3 + 2 \times 4 + 3 \times 4)y + 2 \times 3 \times 4 \\(y+3)(y+4)(y+5) &= y^3 + (3+4+5)y^2 + (3 \times 4 + 3 \times 5 + 4 \times 5)y + 3 \times 4 \times 5\end{aligned}$$

- (a) In the same way, multiply out $(y+4)(y+5)(y+6)$.
(b) In the same way, multiply out $(y+a)(y+b)(y+c)$.

11. Express each of the following as a single fraction in its simplest form.

(a) $\frac{3}{a} + \frac{1}{3a}$

(b) $\frac{6}{x} - \frac{5}{x^2}$

(c) $\frac{5}{2x} - \frac{3}{2x^2 + 4x}$

12. Given that $\frac{1}{2} + \frac{1}{3} + \frac{1}{12} + \frac{1}{18} + \frac{1}{x} = 1$, find the value of x .

13. How many positive square numbers are factors of 1600?

14. Factorise $4y^2 - 9$ and hence simplify $\frac{8y-12}{4y^2-9}$, $y \neq \pm \frac{3}{2}$.